First, as shown in FIG. 4A, a base insulation film 102 is formed on a surface of a semiconductor substrate 101. Here, a TEOS film is used as the base insulation film 102. Substantially, a wiring groove of its desired size and shape is formed at a predetermined part on the surface side of the base insulation film 102, and then, a barrier metal 103 and Cu wire 104 consisting of Cu as a main material are formed inside of the wiring groove in accordance with a conventional CMP process. In addition, the surfaces of the base insulation film 102, barrier metal 103, and Cu wire 104 are flattened.

Next, as shown in FIG. 4B, a silicon nitride film 105 is formed as a barrier insulation film on the surfaces of the flattened base insulation film 102, barrier metal 103, and Cu wire 104.

Next, as shown in FIG. 4C, an interlayer insulation film 106 with its low dielectric rate is provided on a silicon nitride film 105. Here, a polymethyl siloxane film is used as the interlayer insulation film 106 with its low dielectric rate.

Hereinafter, the steps of forming the above polymethyl siloxane film will be described in detail by dividing the steps into steps 1 to 4.

In the following description, as shown in FIG. 4B, if up to a SiN layer 105 is formed, it is referred to as a first semiconductor substrate 108. The steps 1 to

4 described below are sequentially executed on the first layer semiconductor substrate 108, whereby a desired semiconductor device 108 can be obtained.

Step 1:

A liquid-like raw material called a vanish (not shown) obtained by dissolving a film material or a polymethyl siloxane for a precursor of the film material is supplied on a surface of the silicon nitride film 105.

As a method for supplying the vanish, there is employed a coating technique capable of supplying the vanish uniformly with substantially uniform thickness so that a good quality polymethyl siloxane film is formed in the present embodiment. In this vanish coating work, specifically, a coater (not shown), for example, is used as a coating device, whereby a vanish is applied on the surface of the silicon nitride film 105 by using a spin coating technique that is one kind of the coating methods.

Step 2:

A first layer semiconductor substrate 108, as shown in FIG. 4C, is placed on a hot plate 107 (heating device) that as a temperature control unit at a posture at which a silicon nitride film 5 having its vanish applied thereto is oriented upwardly. Then, the temperature of the hot plate 107 is controlled so that the vanish temperature is held at about 80℃; the vanish

is heated together with the first layer semiconductor substrate 108, and this state is held for about one minute. In this manner, a first heating process is applied to the vanish.

Step 3:

While the semiconductor substrate 108 is placed on the hot plate 107, the temperature of the hot plate 107 is controlled so that the vanish temperature is held at about 200℃. Then, the vanish is heated together with the first layer semiconductor substrate 108, and this state is held at about 1 minute. In this manner, a second heating process is applied to the vanish.

The solvent contained in the vanish is removed by evaporation in accordance with the heating process of the steps 2 and 3 each, and the vanish (coat film) is fixed (deposited) on the silicon nitride film 105.

According to experiments made by the inventors, as in the steps 2 and 3, a heating process for increasing the vanish temperature in a stepwise manner is employed, thereby clearly making it possible to evaporate a component (for example, solvent) other than polymethyl siloxane that is one of the essential components of the polymethyl siloxane film in the vanish efficiently and substantially completely and to effectively fix the coat film.

Step 4:

While the first semiconductor substrate 108 is